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The Effects of Reward, Race, Iq, and Socioeconomic Status on Creative Production of Preschool Children.

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THE EFFECTS OF REWARD, RACE, IQ, AND SOCIOECONOMIC STATUS ON CREATIVE PRODUCTION OF PRESCHOOL CHILDREN

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ABSTRACT

The purpose of this study was to investigate the role of reward, race, socioeconomic level, and Stanford Binet IQ scores as factors in the creative thinking capacity of very young children.

Sixteen groups of 4 year old children were given four tasks designed to elicit responses that could be scored for four of the divergent thinking factors that have been isolated by Guilford through factor analysis. Two divisions of race (Negro and white), two levels of socioeconomic index (0 to 3, and 5 to 7), two levels of IQ scores (86 to 105, and 111 to 136), and reward or nonreward, defined the axes of a 2 x 2 x 2 x 2 factorial design. The responses of the first 8 groups, 40 Ss, were used as norms for determining the degree of originality, or uncommonness of response for the second 8 groups, 40 Ss, which received a small toy as reinforcement whenever a response, other than a common one, was given. Weights determined from the total sample were then used for originality and figural flexibility scores. Measures of semantic flexibility and fluency were determined by the number of different response categories and the number of different responses, respectively.

The results show that reward and socioeconomic index are important factors for total divergent thinking, as measured in this study. The rewarded groups scored significantly higher ($p < .001$) than the nonrewarded groups, and the high socioeconomic index groups scored significantly higher ($p < .001$) than the low socioeconomic groups. The race x IQ interaction was also significant ($p < .05$) for the total of the divergent thinking measures. In this instance low IQ, white children scored higher than the high IQ, white children, while the reverse was the case for Negro children.

On the bases of the data presented the following conclusions appear to be tenable:

1. Three of the criteria used in the study (originality, semantic flexibility, and fluency) appear to reflect the same aspect of cognitive functioning, divergent thinking.

2. Differences in divergent thinking capacities are discernible in preschool children.

3. Differentiation of the convergent (as measured by the Stanford-Binet) and divergent thinking capacities is apparent very early in childhood.

4. Immediate material reinforcement has an overall enhancing effect on the divergent thinking of very young children.

5. Training for divergent thinking, as conducted in this study, does not improve one divergent thinking factor at the expense of another.

6. Cultural deprivation, in terms of the environmental conditions resulting from the parental education and occupation, has a negative effect on the divergent thinking of preschool children.

7. Negro children who obtain low IQ scores (and particularly those of low socioeconomic status) are likely to obtain lower divergent thinking scores, as obtained under the condition of this study, than other group combinations based on race, socioeconomic index, and IQ scores.

CHAPTER I

INTRODUCTION

Since Guilford gave his presidential address on creativity to the A.P.A. there has been a considerable increase of research in this area. At that time he hypothesized a number of characteristics of creative individuals. These he felt to be: (1) sensitivity to problems; (2) fluency; (3) originality; (4) flexibility; (5) synthesizing and analyzing abilities; (6) reorganization and redefinition; (7) complexity; and (8) evaluation. Since then Lowenfield (1958) working with creative artists has arrived at characteristics strikingly similar to those found by Guilford who used creative scientists. Thus, it appears that creative individuals, whether working in the arts or sciences, have common attributes.

Creativity is commonly defined in terms of the product of a creative act. A few writers refer to it as a process. Stein (1953, p. 311) feels that "The creative work is a novel work that is accepted as tenable or useful or satisfying by a group in some point of time." As Torrance (1963a, p. 80) points out, "Creativity is defined in many ways, ranging from definitions which make every adaptive

act a creative act, to those extremely rare experiences which result in earthshaking scientific breakthroughs and great artistic triumphs.

The intellectual, motivational, and personality characteristics of creative individuals have been the chief focus of researchers. Guilford, (1950, 1956, 1959a) in his search for the dimensions of the intellect, has led the way in uncovering intellectual factors other than those commonly measured by IQ tests. Implicit in his work and the work of Torrance (1959) and Getzels and Jackson (1962) is the assumption that there is no one-to-one relationship between the "gifted," as measured by IQ tests, and the creative. Dimensions measured by creativity tests have very low correlations with the well established intellectual dimensions as measured by popular intelligence tests. Taylor (1962) feels that creative thinking probably involves two relatively separate dimensions of intellectual and creative abilities. However, these are not the only ingredients that go into the creative process and production. Apparently there are many non-intellectual characteristics involved in a creative act. Taylor (1960, 1962) summarizes some of the many motivational and personality factors that have been found to be related to the creative individual. A few listed under motivational are: curiosity and

manipulative drives, need for recognition for achievement, need for variety, need for autonomy, and preference for complexity. Some of the personality characteristics are tolerance of ambiguity, self-sufficiency, independence in judgment, complexity as a person, self-acceptance, and many others. Torrance (1962) compiled a list of 84 personality characteristics found in one or more studies that differentiated highly creative persons from less creative ones.

The present study will investigate the importance of reward, race, socioeconomic level, and IQ as determinants of creativity in preschool children. To date the main research approach has been to study the characteristics of creative adults with the hope of tracing these back to the earlier developmental stages. As Taylor (1960) points out, an alternate approach might be to study creativity "in the more natural state" in children before there is much chance for it to be distorted, inhibited, or even blotted out. Torrance (1962) has done extensive work in this area with school children. Following Guilford's model he has devised a number of techniques appropriate for measuring creativity in children. From his data he concludes ". . . many highly creative children at almost all ages sacrifice their creativity by repressing their creative needs and abandoning

creative activities. For some children, this occurs during the kindergarten period. With favorable conditions in the primary school, some of them recover, but apparently some do not." (Torrance, 1962, p. 125) He is quite emphatic in his condemnation of most school practices of demanding conformity to authorative thinking while original thinking goes unrewarded.

For these reasons it is felt that there is a need to study the creative potential of children before they come under the influence of the educational process. There has been relatively little research done at the preschool level. Torrance (1962) summarizes a few studies pertaining to imaginative activity of very young children that were done in the 20's and 30's. Most of these studies used responses to inkblots and paintings in attempting to assess the imaginative process of young children. McDowell and Howe (1941) used play materials--blocks, paints, and clay--with two to four-year-old children to ascertain the relationship between sex, chronological age, and IQ of this age group and their creative ability. Northway and Rooks (1955) more recently attempted to relate sociometric status of nursery school children to creativity as measured by the MC Callum form board. In this study the author assumes that the best way to examine the "Roots of creativity" in the young child is by observing how he approaches a task in which he is free

to follow a model or to use his own ingenuity.

While studying children before they come under the conforming influence of our educational system eliminates probably one of the more important inhibitors of creative potential, there are still other factors to consider. As Stein (1953) suggests, parent-child relationships and child-rearing techniques that result in excessive repression or guilt may interfere with the creative process. That there is a relationship between the creative process and environment is implicit in the following statement by Stein (1953, p. 318), ". . . a culture fosters creativity to the extent that it provides an individual with the opportunity to experience its many facets. A culture that limits the freedom of a person to study in one or a variety of areas cuts down his opportunity to pick out the gaps that exist in the culture and also keeps him from learning the necessary media of communicating his feelings or ideas." A variable that appears to be important in this respect is race. There are very few studies relating creativity and race. In a developmental study of originality for various cultures, Torrance (1962) found considerable difference between originality scores of primary grade Negro children attending a segregated school and "other" U.S. school children. There are no studies at the preschool level in regard to racial difference in creativity. In regard to

socioeconomic factors, there are conflicting views, particularly with respect to the importance of security. Maslow (1954) holds that only after the individual feels secure in more basic areas is he free to self-actualize and create. That is, as long as the individual is insecure in the gratification of the lower level needs, he does not invest his energies in the pursuit of creative activities. On the other hand, as Haimowitz and Haimowitz (1960) point out, there are numerous instances in the lives of highly creative individuals in which are found many conditions associated with insecurity--poverty, broken homes, rejection, death of parents, and physical handicaps.

Correlations between abilities measured by IQ tests and abilities measured by creativity tests are commonly found to be low, but positive, for adults and school children (Getzels and Jackson, 1962; Torrance, 1962). The relationship has not been sufficiently studied with preschool children but it is believed to also be low. McDowell and Howe (1941) found a low but positive relationship (r=.15) using the Stanford-Binet intelligence test with preschool children of professional men. There are no recent studies using this age group in which IQ is related to creative measures using the Guilford model.

Many writers (Barron, 1961; Mooney, 1956; Taylor, 1960; Torrance, 1962; Taba, 1963) agree that creative potential

can be inhibited or reduced by our educational practices; however, there has been little systematic investigation to determine whether the fundamental principles of motivation and learning are applicable to the development of creative behavior. Torrance (1963b) argues that if we want children to think creatively, we must reward creative behavior. The question raised here is: Can creative behavior be enhanced by a system of rewards? Guilford (1959b) concludes from his brief discussion on the training for creativity that such efforts are likely to yield improvements in quality at the expense of quantity. That is, increased originality of response at the expense of fluency. Maltzman, et al., (1958) using verbal reinforcement as reward for responses judged to be uncommon found that this form of reinforcement did not produce a significant increase in originality. Maltzman (1960, p. 230), in his paper on the training of originality states ". . . we would agree that the way to foster originality is to reinforce such behavior when it occurs. A basic difficulty is that it may not occur at all or at such infrequent intervals that the reinforcement cannot shape up such behavior."

The null hypotheses under consideration in this study are:

1. Reward does not enhance the creative thinking measures of originality, flexibility, and fluency.
2. There are no cultural differences in creative behavior.
   a. There are no differences in creative thinking potential between white and Negro preschool children.
   b. High socioeconomic status groups do not demonstrate more creative thinking than low socioeconomic groups.
3. There is no relationship between IQ and creative measures for very young children.

CHAPTER II

METHOD

Subjects

The Ss were taken from nursery schools in Baton Rouge and New Orleans, and from the Collaborative Child Development Program at Charity Hospital in New Orleans. All 80 Ss (42 boys and 38 girls) were 4 years of age, that is, from 4 years, 0 months to 4 years, 11 months. There were 16 groups, 5 Ss each, based on reward, race, socioeconomic index, and IQ. Race was based simply on the condition that the individual was considered Negro (or white) by his environment. Attendance of a segregated nursery school or the Collaborative Program was the criteria used for satisfying this condition. The socioeconomic index was based on two factors--educational level of the father (or the mother if there was no father in the home), and occupation of the father (or mother). An eight point scale was used to rate each subject. Education level was rated from 0 to 4, with an elementary education and below receiving a 0 and college graduate and above receiving a 4. Occupational level was rated similarly with unskilled occupations receiving a 0 and professionals a 4. The low SEl groups were made up of Ss receiving combined ratings of 0, 1, 2, and 3. The high SEl groups consisted of Ss receiving combined ratings of 5, 6, 7, and 8. IQ refers to the child's score

on the short form of the Stanford-Binet Intelligence Scale (Form L-M). The Ss receiving IQ's of 105 and below were placed in the low IQ groups; those with 111 and above were placed in the high IQ groups. The range of IQ scores for all Ss was from 86 to 136. The mean of the low IQ group was 97; the high IQ group 119. By race, the Negro group mean was 107; white 109.

Procedures and Measures

1. Divergent Thinking Measures

Four divergent thinking measures of creativity were obtained from each child--originality, semantic flexibility, fluency, and figural flexibility. Four tasks were administered to obtain these measures.

Circles and Squares Task. This task was designed by Torrance (1962) to obtain measures of fluency, flexibility, and originality for school children. It has been adapted here for preschool children. The materials used are two ink stamped sheets of white paper with nine circles on one and nine squares on the other. The instructions were as follows: "See how many things you can make from these circles. With the pencil add lines to the circles to make your drawing. Your lines can be inside or outside the circle." Demonstrations were given of a man and a flower.

After the completion of each object the examiner numbered the order of the object sketched. A name for each object was requested and recorded on another page. It is the "label" that the child gives to his production which is of importance here. The semantic flexibility score on this task was the number of different object categories produced. Fluency score was the number of different responses given. Frequency of responses for all Ss was tabulated in order to determine the originality of a response. Weights of 1 to 5 were assigned on the basis of statistical frequency--1, greater than 20%; 2, 16 to 20%; 3, 11 to 15%; 4, 6 to 10%; and 5, 5% or less. The originality score was the total of weights received by each response.

Sketch Task. Each subject was given 10 trials to sketch something on a Sketch-O-Matic toy machine. Essentially this is a screen on which lines are made automatically when the child moves a vertical handle. This handle resembles a small pencil and can be moved in all directions. After a demonstration of an airplane was drawn the subject was allowed a practice trial. The instructions consisted of simply telling the child to draw something. A name for each drawing was requested and recorded. Each "label" was scored for semantic flexibility, fluency, and originality based on weights derived in the same manner that the weights

were obtained for the Circles and Squares Task.

Blocks Task. The materials used in this task consists of two sets of 30 pieces of variously shaped wooden blocks. One set of blocks was presented to the subject with the following instructions: "Here are some blocks with which you can build things. Make something with them and use as many blocks as you wish." Four trials were given and the label given each construction was recorded. The products of the last two trials were photographed together. All four responses on this task were scored for semantic flexibility, fluency, and originality based on weights derived in the same manner as discussed above.

Hidden Figures Task. The materials for this task consists of nine drawings with a focal scene and an embedded animal in the background. Attention was called to the focal scene then the child was asked to find the hidden animal, the name of which was given. No time limit was enforced. Incorrect trials were considered completed when the child either replied that he could not find it, or pointed to an incorrect location. A figural flexibility score was obtained from this task by totaling the number of points received for each correct response. Each drawing was assigned a value from 0 to 8 based on the frequency of children in the sample making a correct response to that

drawing. For example, all children responded correctly to figure 1, whereas, only 5% responded correctly to figure 8. Consequently these figures had values of 0 and 8 respectively.

2. Reward

The first 40 Ss were not rewarded with reinforcement as defined here, however, they were encouraged and comments like "that's good, go on to the next one" were used to keep the child focused on the task. Responses of the first 40 Ss were tabulated for percentage of occurrence. Responses given by more than 15% of the Ss were considered to be common responses and were not to be rewarded for the second 40 Ss. Common responses on the Circles and Squares Task that were not rewarded were: letters of the alphabet, ball, flower, box, circle, man, lady, girl, boy, and numbers. For the Sketch Task these responses were not rewarded: airplane, letters of the alphabet, boat, car, circle, house, man, rock, and shoe. Bed, bridge, building, and house were the responses that did not receive any reward on the Blocks Task. When a response not included in the list was given, the subject was given a small trinket and told "that was a winner." When a common response was given the subject was told "that does not win, try again." If a subject repeated an uncommon response for which he had previously received a

trinket on the same task, he was not rewarded the second time. In this way not only is originality rewarded but also flexibility and fluency. With the Hidden Figures Task a reward was given for the correct location of the hidden figure of each picture. Thus, there was a total of a possible 41 rewards on all four tasks. The trinkets consisted of a variety of charms, whistles, and rings. They were selected and placed into a box so that the child received his reward just after giving the proper response. The only advanced instructions added to the original instructions, for the group that was rewarded, was that they would be given one of the trinkets from the bag every time they got a "winner," and that they could take the box of trinkets that they won with them when they left.

3. Rating Measures

An additional analysis of the Circles and Squares Task and the Blocks Task was carried out to insure that products which appeared very clever, and of high quality would be given sufficient recognization. Five judges were asked to rate the products of 16 Ss--one from each group. Each page of circles and squares, and the photograph containing the 2 responses on the Blocks Task were rated on a 5 point scale (1 to 5) for the "communication" value and the "creativeness" value. Communication was

defined as the degree that a child's productions resembles the labels he gave to them. Creativeness was defined as the degree that the child's productions were clever, ingenious, novel, or imaginative. The communication and creativeness scores for each child were merely the sum of the three ratings for circles, squares, and blocks. The judges were four Ph.D. psychologists and the present writer.

Data Analysis

A computer programmed multiple factorial analysis of variance was employed. All of the divergent thinking scores were first converted to standard scores in order that the scores on each task could be added together to get an originality, semantic flexibility, fluency, an figural flexibility score for each subject. Then these scores were added to get a single "Total Divergent Thinking" score for each subject. Since two of the variables (Reward and Race) were fixed and two were random (SEl and IQ) the data were analyzed as a mixed model with a factorial arrangement of treatments.

CHAPTER III

RESULTS

The Effect of Reward on Creativity

Tables 3, 4, and 5 indicate that reward is a highly significant factor. All of the Fs except for figural flexibility are significant beyond the 1% level. Inspection of Table 1 reveals that reward did not enhance all of the individual measures of creativity. Reward increased the originality, semantic flexibility and fluency scores and decreased the figural flexibility score. This indicates that the significant F ($p < .05$) for reward on this measure was due to the superior performance of the nonrewarded groups over the rewarded ones. Comparison of the means in Table 2 of the nonrewarded and rewarded groups on this measure shows that this is true for each group. Otherwise, all groups show an increase except the high SEI, high IQ, Negro groups on the fluency measure. Figures 1, 2, and 3 illustrate graphically the relation of reward to race, SEI, and IQ for total divergent thinking. All groups show a large increase, however, the low IQ groups appear to be particularly enhanced by the effect of reward. There were no significant simple interactions between reward and

TABLE 1

Means of Main Effects for Divergent Thinking Measures (Standard Scores)

	Reward		Race		SEI		IQ	
	Yes	No	White	Negro	High	Low	High	Low
Originality	.921	-.918	.402	-.399	.426	-.424	.107	-.105
Semantic Flexibility	1.202	-1.190	.626	-.614	.566	-.553	.187	-.175
Fluency	1.312	-1.171	.322	-.181	.651	-.510	.178	-.038
Figural Flexibility	-.238	.239	.206	-.206	.197	-.196	.106	-.105

TABLE 2

Group Means for Divergent Thinking Measures (Standard Scores)

Groups			Originality		Semantic Flexibility		Fluency		Figural Flexibility		Total Divergent Thinking	
Race	SEI	IQ	Non-Reward	Reward	Non-Reward	Reward	Non-Reward	Reward	Non-Reward	Reward	Non-Reward	Reward
W	H	H	.082	1.442	-.549	2.457	-1.181	2.234	.975	-.233	-.672	5.900
W	H	L	.688	1.774	-.189	2.722	-1.248	3.084	.499	.243	-.250	7.823
W	L	H	-.901	.187	-.397	.699	-1.483	.880	.023	-.416	-2.757	1.350
W	L	L	-1.126	1.065	-.824	1.089	-.707	.994	.756	-.196	-1.901	2.951
N	H	H	-.555	.922	-.499	.121	.553	.222	.756	.463	1.694	1.729
N	H	L	-1.526	.581	-1,334	1.796	-.412	1.953	-.453	-.672	-3.724	3.337
N	L	H	-1.799	1.480	-2.034	1.701	-1.156	1.361	-.233	-.489	-5.222	4,053
N	L	L	-2.209	-.084	-3.692	-.968	-3.735	-.233	-.416	-.599	-10.079	-1.885

TABLE 3

Table of F Values for Originality and Semantic Flexibility Scores

Source	Originality F	Originality p	Semantic Flexibility F	Semantic Flexibility p
Reward	19.64	.001	45.05	.001
Race	3.72	ns	12.10	.001
SEI	4.19	.05	2.36	ns
IQ	*	ns	*	ns
Reward x Race	*	ns	*	ns
Reward x SEI	*	ns	*	ns
Reward x IQ	*	ns	*	ns
Race x SEI	*	ns	*	ns
Race x IQ	2.16	ns	2.04	ns
SEI x IQ	*	ns	4.18	.05
Reward x Race x SEI	*	ns	3.88	ns
Reward x Race x IQ	*	ns	*	ns
Reward x SEI x IQ	*	ns	*	ns
Race x SEI x IQ	*	ns	2.50	ns
Reward x Race x SEI x IQ	*	ns	2.42	ns

*F values less than 1

TABLE 4

Table of F Values for Fluency and Figural Flexibility Scores

Source	Fluency		Figural Flexibility	
	F	p	F	p
Reward	39.39	.001	5.08	.05
Race	1.61	ns	*	ns
SEI	8.61	.01	3.47	ns
IQ	*	ns	*	ns
Reward x Race	*	ns	1.27	ns
Reward x SEI	*	ns	*	ns
Reward x IQ	1.55	ns	*	ns
Race x SEI	*	ns	*	ns
Race x IQ	2.57	ns	4.51	.05
SEI x IQ	2.33	ns	3.16	ns
Reward x Race x SEI	5.86	.05	*	ns
Reward x Race x IQ	1.17	ns	*	ns
Reward x SEI x IQ	1.08	ns	*	ns
Race x SEI x IQ	2.54	ns	*	ns
Reward x Race x SEI x IQ	*	ns	*	ns

*F values less than 1

TABLE 5

Table of F Values for Total Divergent Thinking Score

Source	F	p
Reward	34.61	.001
Race	1.35	ns
SEI	12.83	.001
IQ	1.43	ns
Reward x Race	*	ns
Reward x SEI	*	ns
Reward x IQ	1.00	ns
Race x SEI	*	ns
Race x IQ	5.62	.05
SEI x IQ	*	ns
Reward x Race x SEI	3.85	ns
Reward x Race x IQ	*	ns
Reward x SEI x IQ	1.17	ns
Race x SEI x IQ	*	ns
Reward x Race x SEI x IQ	*	ns

*F values less than 1

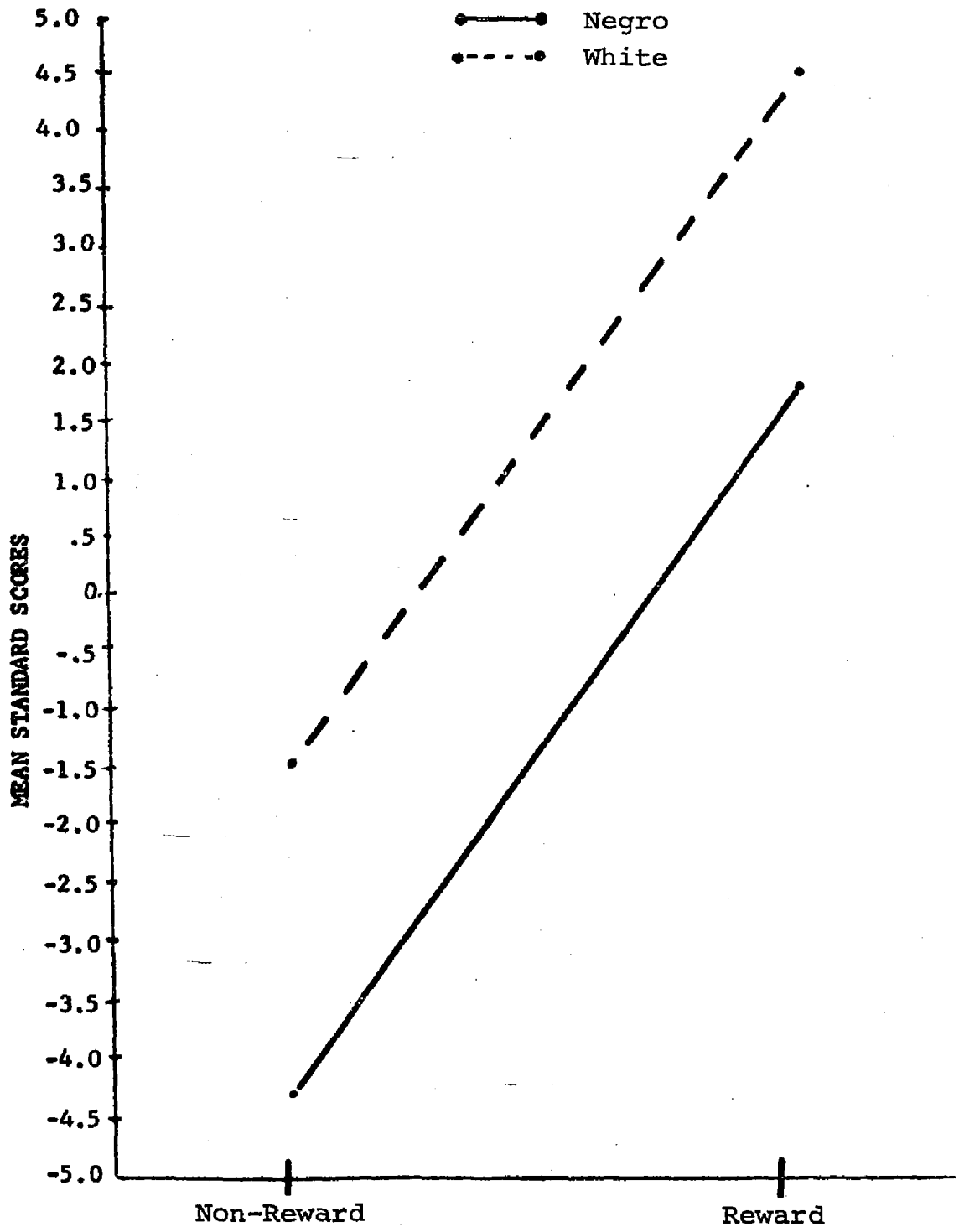

Figure 1. Relation of Reward and Race to Total Divergent Thinking.

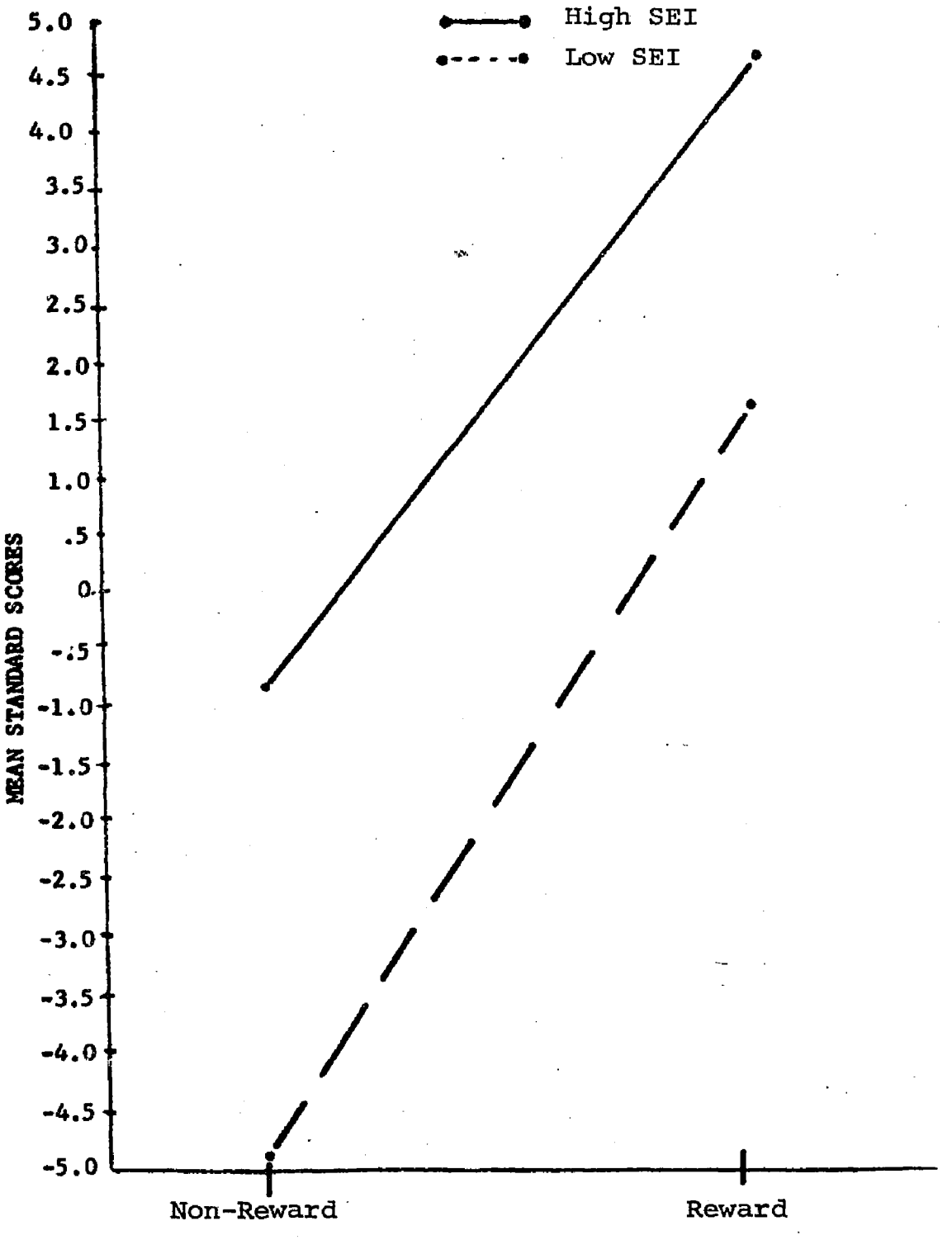

Figure 2. Relation of Reward and SEI to Total Divergent Thinking.

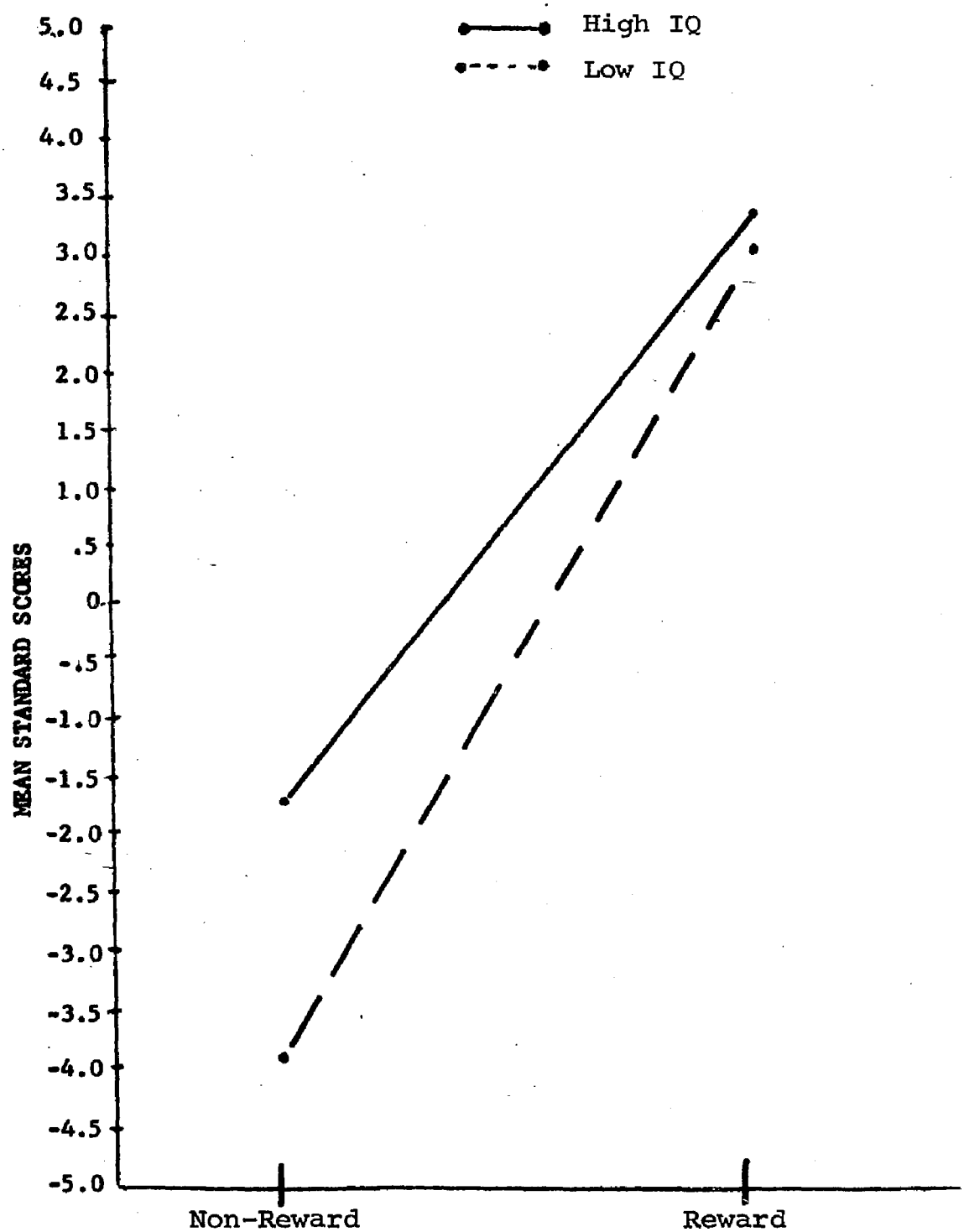

Figure 3. Relation of Reward and IQ to Total Divergent Thinking.

these variables, although the triple interaction of reward x race x SEI for the fluency measure was significant. With reward the high SEI white group shows a greater increase in mean values than the low SEI white group; whereas, the reverse is true for the Negro groups.

Race as a Factor in Creativity

Race, in itself, was significant only for the semantic flexibility factor. White children were significantly ($p < .001$) more flexible than Negro children. The race x IQ interaction was significant for the total score ($p < .05$) and for the figural flexibility score ($p < .05$). For white children the low intelligent were more creative, and for Negro children the high intelligent were more creative. This relationship for total divergent thinking is presented in Figure 4. While white and Negro high IQ children were similar in divergent thinking, Negro low IQ children were much less divergent than white low IQ children.

Socioeconomic Index as a Factor in Creativity

There were three significant Fs for SEI: originality ($p < .05$), fluency ($p < .01$) and total divergent thinking ($p < .001$). In each instance the high SEI children were more creative. Figures 5 and 6 show the relations of divergent thinking to SEI and race, and to SEI and IQ. Low SEI white children did better than the low SEI Negro children,

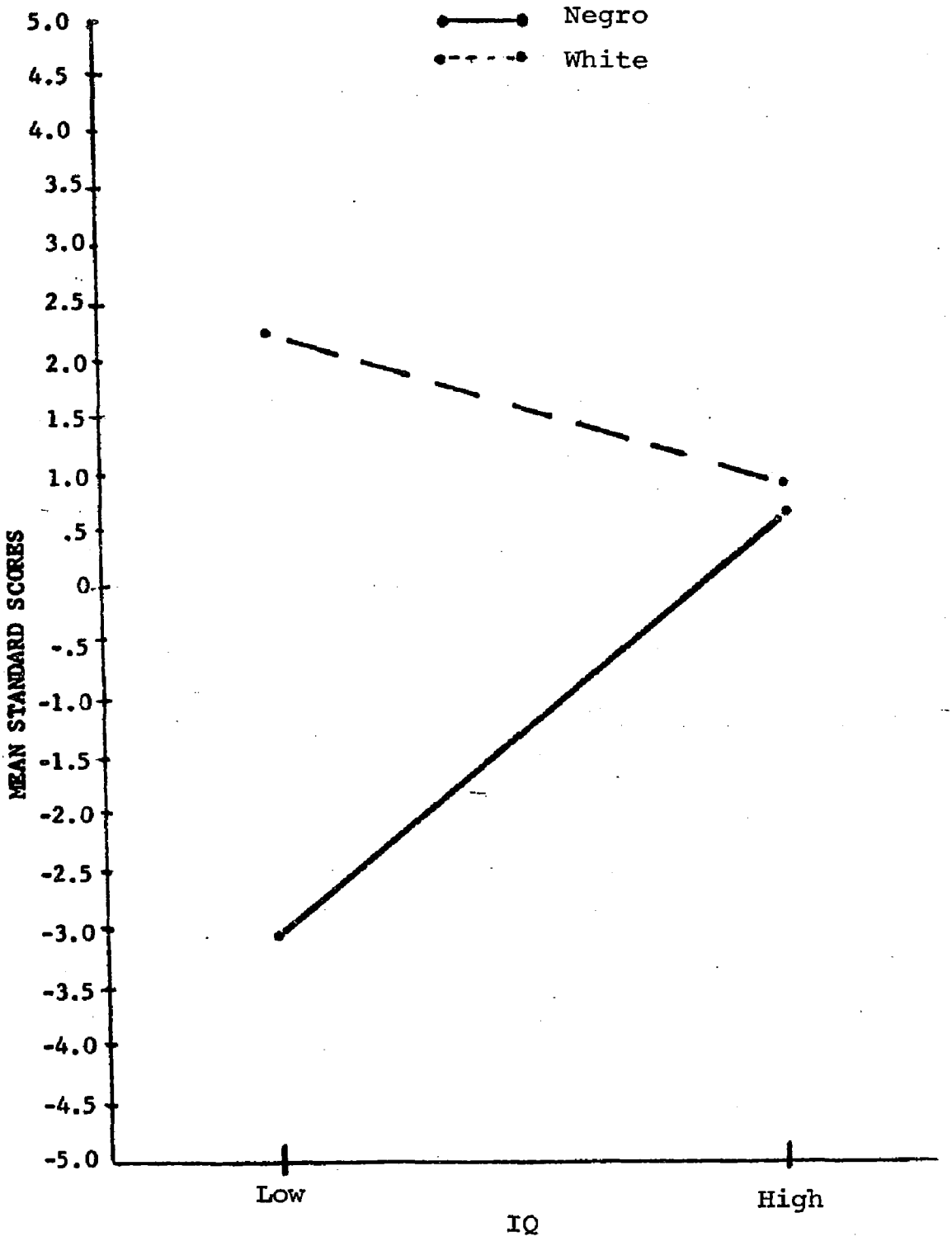

Figure 4. Relation of IQ and Race to Total Divergent Thinking.

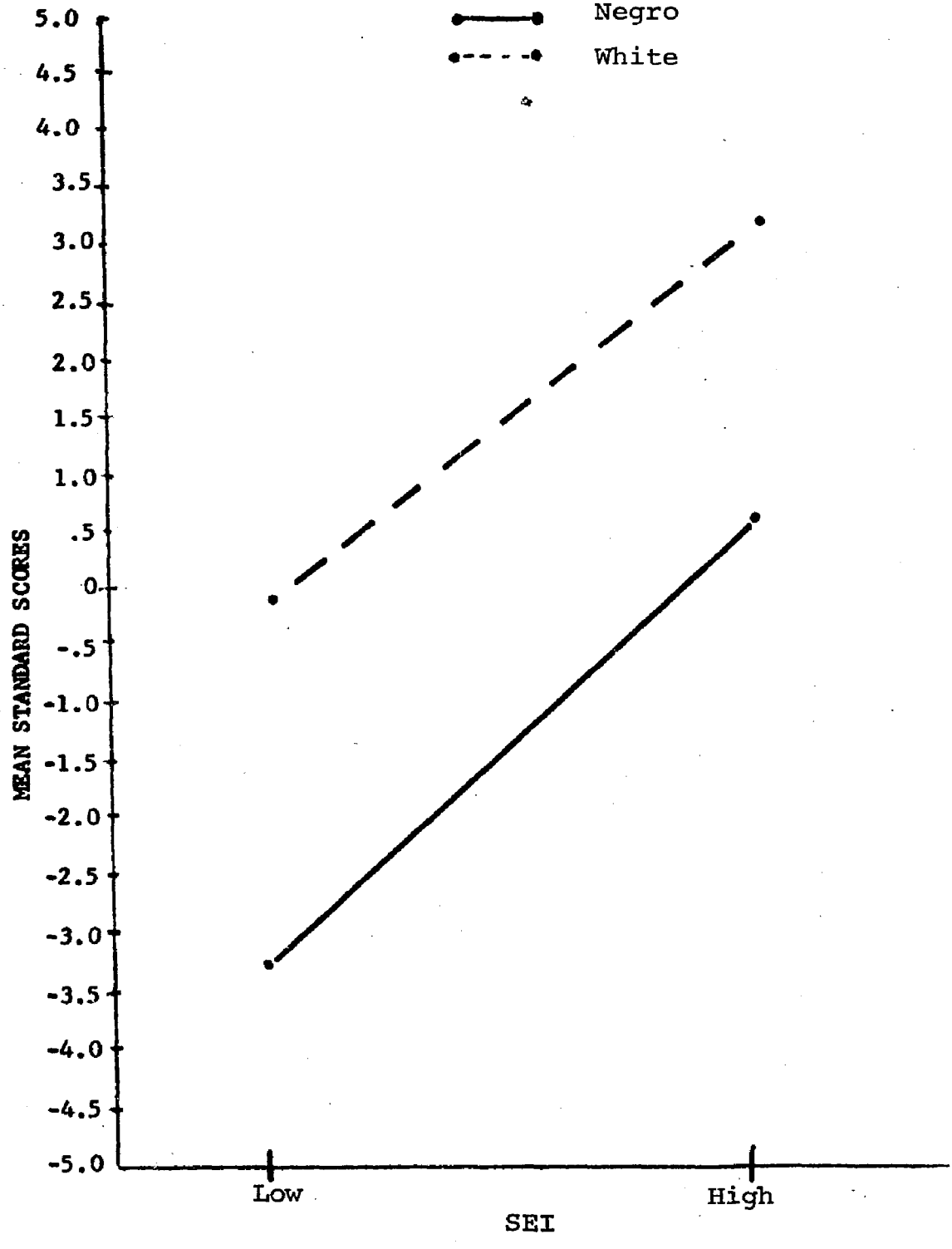

Figure 5. The Relation of SEI and Race to Total Divergent Thinking.

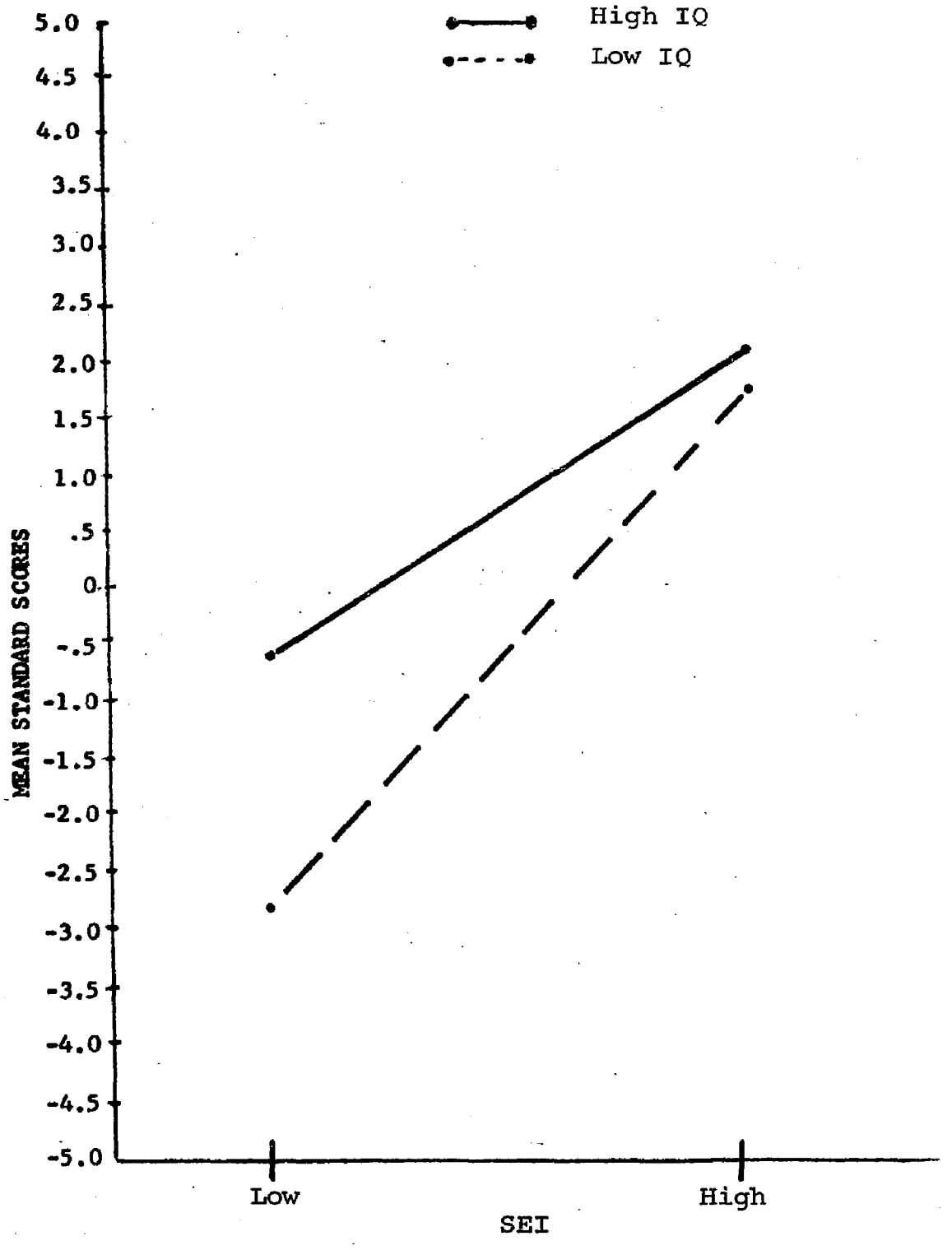

Figure 6. Relation of SEI and IQ to Total Divergent Thinking.

and the high SEI white children were superior to the high SEI Negro children. High SEI children of high and low intelligence tend to be more similar in divergent thinking capacity than low SEI children.

There was a significant first order interaction between SEI and IQ for the semantic flexibility measure ($p < .05$). For this measure, low IQ children of high SEI were more flexible than high IQ children of high SEI. On the other hand, high IQ children of low SEI were more flexible than the low IQ, low SEI children. The higher order interaction of SEI with reward and race for the fluency measure was discussed above.

IQ as a Factor in Creativity

IQ, in itself, was not significant as a variable for any of the measures. The simple interactions of race x IQ, and SEI and IQ were already discussed.

Judges Ratings of Products

Tables 6 and 7 give the means and Fs for the communication and creativity ratings. There were no significant main effects. The simple interaction of reward x SEI was significant at the 5% level of confidence. Reward had a differential effect on the SEI levels. With reward, high SEI groups received higher ratings than low SEI groups. Without reward

TABLE 6

Means of Main Effects for Rating Measures

	Communication	Creativity	Total
Reward	6.8	7.8	13.6
Non-reward	8.6	7.6	16.1
Negro	7.5	7.3	14.7
White	7.9	8.1	16.0
High SEI	7.7	8.0	15.7
Low SEI	7.6	7.4	15.0
High IQ	8.1	7.9	15.9
Low IQ	7.3	7.5	14.8
Judge 1	7.7	9.4	17.1
Judge 2	7.8	7.0	14.8
Judge 3	8.7	6.8	15.4
Judge 4	7.1	9.8	16.9
Judge 5	7.1	5.4	12.5

TABLE 7

Table of F Values for Ratings by Judges

Source	Communication F	Communication p	Creativity F	Creativity p	Total F	Total p
Reward	1.8	ns	*	ns	*	ns
Race	*	ns	*	ns	2.0	ns
SEI	*	ns	1.5	ns	*	ns
IQ	1.8	ns	*	ns	1.7	ns
Reward x Race	*	ns	*	ns	*	ns
Reward x SEI	5.6	.05	3.3	ns	6.3	.05
Reward x IQ	1.5	ns	*	ns	1.1	ns
Race x SEI	*	ns	*	ns	*	ns
Race x IQ	*	ns	*	ns	1.1	ns
SEI x IQ	*	ns	*	ns	*	ns
Reward x Race x SEI	*	ns	1.8	ns	1.0	ns
Reward x Race x IQ	*	ns	*	ns	*	ns
Reward x SEI x IQ	*	ns	*	ns	*	ns
Race x SEI x IQ	*	ns	5.7	.05	2.6	ns
Reward x Race x SEI x IQ	*	ns	*	ns	*	ns

*F values less than 1

the reverse was the case. This effect was primarily due to the communication measure, although the creativity measure showed a trend in this direction and was just short of significance. The only significant F ($p < .05$) for the creativity rating was the triple interaction of race x SEI x IQ. In this instance there was little difference in the means of the high SEI children of both races and IQ levels. However, there were differences between the races for different IQ levels of the low SEI groups. That is, the low intelligent, low SEI, white children received higher mean ratings than did the high intelligent, low SEI white children (8.5 to 7.4), whereas, the reverse was the case for low SEI Negro children (5.3 to 8.2).

Perhaps the most significant finding in the rating aspect of the study is the apparent lack of agreement by the judges on the creativity judgments. The mean judgments ranged from 5.4 to 9.8 on a 13 point scale.

CHAPTER IV

DISCUSSION

While no correlations among criterion scores were determined, the relatively high similarity in significance, or lack of it, for a variable suggests that at least three of these criteria reflect the same aspect of cognitive functioning; namely, the capacity for divergent thinking. This is corroborated by the trends of the means. There may be some question regarding figural flexibility, as determined by the Hidden Figures Task, as a measure of divergent thinking in preschool children.

The use of judgments of products of the nature used in this study are apparently of little use for this age group. This technique is not sensitive enough to detect differences in products unless they are gross differences. In most cases, at this age, the child does not have the skill to reproduce an idea or image adequately. The subjective evaluations by judges of childrens' productions may be of value in recognizing children of artistic talent but not necessarily of general creative thinking capacities which are of importance to all fields. This does not detract from the use of these techniques to evoke responses

that can be measured for creative thinking.

Considerable training of judges would be required to obtain meaningful results if just the products are to be used as a measure of creativity. Obviously, some judges rated the artistic value of the products while others judged the labels attached to the products. Products considered creative for four-year-olds are very likely to be a function of chronological age, IQ, and practice. There seems to be much less communication between the products and the labels for the 4 year, 0 month child than for the 4 year, 11 month child. Many of the labels are quite clever but the communication value of the products, by themselves, is nil. It is felt that in order to judge a product, alone, it must first communicate. Consequently, it is not likely that judgment of products, in and of themselves, is of much value in arriving at the creative thinking capacity of preschool children unless perhaps the ratings are structured for factors such as communication, elaboration, complexity, etc.

The remainder of the discussion will be in reference to the findings with respect to the objective scoring of the divergent thinking measures.

Reward

The effect of reward in this experiment indicates that the divergent thinking capacities in young children are

enhanced, significantly, by immediate material reinforcement. It does not follow from the present data, however, that creative behavior can be shaped using other methods of reinforcement. Maltzman (1958), it will be recalled, did not find a significant increase in uncommon associations with verbal reinforcement. Yet, in the absence of additional data, it is tempting to hypothesize that the influence of reward may extend beyond such material reinforcement and include a variety of forms. This argument suggests that the next step in examining this question should consist of substituting other forms of reward.

That the rewarded groups exhibited superior performance on all of the divergent thinking variables except figural flexibility, would appear to question Guilford's conclusion that the training of original thinking leads to impairment of other creative thinking factors, e.g., fluency.

Cultural Determinants

In general, the null hypothesis is confirmed for the racial factor, but must be rejected for the SEI factor. Although there was a trend favoring white children in respect to originality, the F was not statistically significant. This finding then is not in agreement with Torrance's results regarding Negro children attending segregated schools, as none of the children in the present study

attended integrated nursery schools. One possible explanation of the conflicting findings may lie in the differences in the age groups. Perhaps, unlike Torrance's primary grade school children, younger preschool Negro children are not quite as aware of their social and ethnic roles. The significant race x IQ interaction for total scores might also have some relation to the problem. Reference again to Figure 4 would indicate that the composition of the Negro samples, in terms of IQ, would have an important bearing on the outcome of the divergent thinking scores. A sample made up of lower IQ children would tend to do very poorly on these measures.

The finding that high socioeconomic groups were more creative than low socioeconomic groups can best be explained in terms of cultural enrichment or deprivation. The results are consistent with Maslow's theory of self-actualization. Value systems of lower socioeconomic families are more oriented toward meeting their basic needs. Frequently the families are large and one parent is absent from the home, therefore, the potentially creative child has little opportunity for having his potential recognized, much less rewarded. Children from high socioeconomic families, on the other hand, are more secure in regard to having their basic needs met and at the same time are afforded more opportunity and encouragement to explore their

divergent thoughts. In a sense, families of low socio-economic status perhaps orient their thinking in a converging manner, that is, toward the solution of the problem of security. High socioeconomic families perhaps tend to be more "open-minded" in their thinking.

IQ

The hypothesis of no significant relationship between IQ and creative thinking was supported by the data of this study. This finding is in agreement with the Getzel and Jackson study and others that report a low positive relationship. It is surprising that there was not a closer relationship for this age group, between the capacities traditionally measured on IQ tests and the divergent thinking capacities believed to be measured by this study. This suggests that there is a relatively early differentiation of the convergent and divergent thinking capacities. Perhaps the use of the terms "genius" and "gifted" to describe bright children should be given more consideration.

In concluding, it should be pointed out that interest has been upon the feasibility of the early detection of creative potential as well as the effects of reward and the other variables on creativity. Since international events have placed a premium on creative productivity it is becoming increasingly more important to identify creative

ability early and to provide for its maximum development. It should be recognized, however, that any conclusions which may be drawn upon the basis of scores derived from the instruments and techniques used in this study must be considered as highly tentative, because they have been modified to be suitable for preschool children. Also there are a number of other factors that Guilford has defined within the realm of divergent thinking that were not used in this study. Only those measures and those tasks which seemed appropriate for preschool children were used. Finally, it should be pointed out that the means in Table 1 indicate consistent differences for each variable, yet the F tests were insignificant in several instances. Perhaps a different analysis (e.g. a simple binomial test) would have shown significant differences for the racial and IQ factors.

SUMMARY

The purpose of this study was to investigate the role of reward, race, socioeconomic level, and Stanford-Binet IQ scores as factors in the creative thinking capacity of very young children.

Sixteen groups of 4 year old children were given four tasks designed to elicit responses that could be scored for four of the divergent thinking factors that have been isolated by Guilford through factor analysis. Two divisions of race (Nego and white), two levels of socioeconomic index (0 to 3, and 5 to 7), two levels of IQ scores (86 to 105, and 111 to 136), and reward or nonreward, defined the axes of a 2 x 2 x 2 x 2 factorial design. The responses of the first 7 groups, 40 Ss were used as norms for determining the degree of originality or uncommonness of response for the second 8 groups, 40 Ss which received a small toy as reinforcement whenever a response, other than a common one, was given. Weights determined from the total sample were then used for originality and figural flexibility scores. Measures of semantic flexibility and fluency were determined by the number of different response categories and the number of different responses, respectively.

The results show that reward and socioeconomic index are important factors for total divergent thinking, as measured in this study. The rewarded groups scored significantly higher ($p < .001$) than the nonrewarded groups, and the high socioeconomic index groups scored significantly higher ($p < .001$) than the low socioeconomic groups. The race x IQ interaction was also significant ($p < .05$) for the total of the divergent thinking measures. In this instance low IQ, white children scored higher than the high IQ, white children, while the reverse was the case for Negro children.

On the bases of the data presented the following conclusions appear to be tenable:

1. Three of the criteria used in the study (originality, semantic flexibility, and fluency) appear to reflect the same aspect of cognitive functioning, divergent thinking.

2. Differences in divergent thinking capacities are discernible in preschool children.

3. Differentiation of the convergent (as measured by the Stanford-Binet) and divergent thinking capacities is apparent very early in childhood.

4. Immediate material reinforcement has an overall enhancing effect on the divergent thinking of very young children.

5. Training for divergent thinking, as conducted in this study, does not improve one divergent thinking factor at the expense of another.

6. Cultural deprivation, in terms of the environmental conditions resulting from the parental education and occupation, has a negative effect on the divergent thinking of preschool children.

7. Negro children who obtain low IQ scores (and particularly those of low socioeconomic status) are likely to obtain lower divergent thinking scores, as obtained under the condition of this study, than other group combinations based on race, socioeconomic index, and IQ scores.

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APPENDIX

APPENDIX A

Source	Expected Mean Squares
R^*	$\sigma_e^2 + a\sigma_{rbc}^2 + ab\sigma_{rc}^2 + ac\sigma_{rb}^2 + abc\sigma_r^2$
A^*	$\sigma_e^2 + r\sigma_{abc}^2 + rb\sigma_{ac}^2 + rc\sigma_{ab}^2 + rbc\sigma_a^2$
$B^\dagger$	$\sigma_e^2 + ra\sigma_{bc}^2 + rac\sigma_b^2$
$C^\dagger$	$\sigma_e^2 + ra\sigma_{bc}^2 + rab\sigma_c^2$
RA	$\sigma_e^2 + \sigma_{rabc}^2 + b\sigma_{rac}^2 + c\sigma_{rab}^2 + bc\sigma_{ra}^2$
RB	$\sigma_e^2 + a\sigma_{rbc}^2 + ac\sigma_{rb}^2$
RC	$\sigma_e^2 + a\sigma_{rbc}^2 + ab\sigma_{rc}^2$
AB	$\sigma_e^2 + r\sigma_{abc}^2 + rc\sigma_{ab}^2$
AC	$\sigma_e^2 + r\sigma_{abc}^2 + rb\sigma_{ac}^2$
BC	$\sigma_e^2 + ra\sigma_{bc}^2$
RAB	$\sigma_e^2 + \sigma_{rabc}^2 + c\sigma_{rab}^2$
RAC	$\sigma_e^2 + \sigma_{rabc}^2 + b\sigma_{rac}^2$
RBC	$\sigma_e^2 + a\sigma_{rbc}^2$
ABC	$\sigma_e^2 + r\sigma_{abc}^2$
RABC	$\sigma_e^2 + \sigma_{rabc}^2$
ERROR	σ_e^2

* FIXED
† RANDOM

VITA

Anthony Francis Savoca was born in New Orleans, Louisiana, on July 21, 1922. He is the only son of Frank and Carrie Munsch Savoca. He is a graduate of Redemptorist High in New Orleans, and of the Army Air Corps Aviation Cadet Program of World War II. He obtained the B.S. degree in 1949 at Tulane University and the M.Ed. degree in 1954 at Loyola University in New Orleans. He became a candidate for the Doctor of Philosophy degree in the graduate school of Louisiana State University in October, 1964.

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